

**WEST**

2/19/1998 198 06872.7

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L1: Entry 1 of 1

File: USPT

Aug 20, 2002

US-PAT-NO: 6436681DOCUMENT-IDENTIFIER: US 6436681 B1

TITLE: Method for producing biotin

DATE-ISSUED: August 20, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Schroder; Hartwig	Nussloch			DE
Hauer; Bernhard	Fussgonheim			DE

US-CL-CURRENT: 435/119; 435/183, 435/252.3, 435/254.11, 435/254.2, 435/320.1, 435/41, 435/440, 536/23.2

## CLAIMS:

We claim:

1. A process for preparing biotin, which comprises expressing a biotin synthase gene selected from the group consisting of sequences SEQ ID NO: 1 and SEQ ID NO: 3 in a prokaryotic or eukaryotic host organism able to synthesize dethiobiotin.
2. A process as claimed in claim 1, wherein the expression of the biotin synthase gene as set forth in claim 1 leads to an increased conversion of dethiobiotin into biotin.
3. A process as claimed in claim 1, wherein the host organism used is an organism selected from the group of genera Escherichia, Citrobacter, Serratia, Klebsiella, Salmonella, Pseudomonas, Comamonas, Acinetobacter, Azotobacter, Chromobacterium, Bacillus, Clostridium, Arthrobacter, Corynebacterium, Brevibacterium, Lactococcus, Lactobacillus, Streptomyces, Rhizobium, Agrobacterium, Staphylococcus, Rhodotorula, Sporobolomyces, Yarrowia, Schizosaccharomyces or Saccharomyces.
4. A process as claimed in claim 1, wherein said host organism has no or only very diminished natural regulation of biotin synthesis such that said organism has a considerably higher than natural biotin productivity.
5. A gene construct comprising a biotin synthase gene selected from the group of sequences consisting of SEQ ID NO:1 and SEQ ID NO:3, which is functionally linked to sequences selected from the group consisting of one or more heterologous regulatory sequences and a genetically modified natural regulatory sequence, where the natural regulation by biotin has been switched off.
6. A gene construct as claimed in claim 5, which has been inserted in a vector which is suitable for the expression of the gene in a prokaryotic or eukaryotic host organism.

7. An organism selected from the group consisting of bacteria, fungi, yeasts and plants comprising a gene construct as claimed in claim 5.

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L3: Entry 3 of 10

File: USPT

Sep 12, 2000

US-PAT-NO: 6117669

DOCUMENT-IDENTIFIER: US 6117669 A

\*\* See image for Certificate of Correction \*\*

TITLE: Biotin biosynthetic genes

DATE-ISSUED: September 12, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Furuichi; Yasuhiro	Kamakura			JP
Hoshino; Tatsuo	Kamakura			JP
Kimura; Hitoshi	Odawara			JP
Kiyasu; Tatsuya	Fujisawa			JP
Nagahashi; Yoshie	Fujisawa			JP

US-CL-CURRENT: 435/252.3; 435/320.1, 536/23.1

## CLAIMS:

What is claimed is:

1. An isolated DNA molecule comprising a polynucleotide encoding the polypeptide of SEQ. ID. No. 2, or an enzymatically active fragment thereof.
2. The isolated DNA molecule of claim 1, comprising a polynucleotide of SEQ ID. No. 1.
3. An expression vector comprising a polynucleotide encoding the polypeptide of SEQ ID No. 2, or a enzymatically active fragment thereof.
4. The expression vector of claim 3, comprising a polynucleotide of SEQ ID No. 1.
5. A biotin-producing cell transformed by an expression vector, wherein the expression vector comprises a polynucleotide encoding the polypeptide of SEQ ID No. 2, or an enzymatically active fragment thereof.
6. The cell of claim 5, wherein the expression vector comprises a polynucleotide of SEQ ID No. 1.
7. A process for producing biotin that comprises culturing in culture medium a biotin-producing cell transformed by an expression vector, wherein the expression vector comprises a polynucleotide encoding a polypeptide of SEQ ID. No. 2, or an enzymatically active fragment thereof, whereby the cell produces biotin into the culture medium, and isolating the produced biotin from the culture medium.
8. The process of claim 7, wherein the expression vector comprises a polynucleotide of SEQ ID. No. 1.

**WEST**[Generate Collection](#)[Print](#)**Search Results - Record(s) 1 through 10 of 10 returned.**☐ 1. Document ID: US 20020098556 A1

L3: Entry 1 of 10

File: PGPB

Jul 25, 2002

PGPUB-DOCUMENT-NUMBER: 20020098556

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020098556 A1

TITLE: OVERCOMING DAPA AMINOTRANSFERASE BOTTLENECKS IN BIOTIN VITAMERS BIOSYNTHESIS

PUBLICATION-DATE: July 25, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
VAN ARSDELL, SCOTT W.	LEXINGTON	MA	US	
YOCUM, R. ROGERS	LEXINGTON	MA	US	
PERKINS, JOHN B.	READING	MA	US	
PERO, JANICE G.	LEXINGTON	MA	US	

US-CL-CURRENT: [435/119](#); [435/120](#), [435/252.31](#), [548/303.7](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
Draw Desc	Image										

☐ 2. Document ID: US 6284500 B1

L3: Entry 2 of 10

File: USPT

Sep 4, 2001

US-PAT-NO: 6284500

DOCUMENT-IDENTIFIER: US 6284500 B1

TITLE: Microorganism resistant to threonine analogue and production of biotin

DATE-ISSUED: September 4, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kanzaki; Naoyuki	Ibaraki			JP
Kawamoto; Tomohiro	Ikeda			JP
Matsui; Junji	Suita			JP
Nakahama; Kazuo	Nagaokakyo			JP
Ifuku; Ohji	Yokohama			JP

US-CL-CURRENT: [435/119](#); [435/252.3](#), [435/252.33](#), [435/441](#), [536/23.1](#), [536/23.2](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
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☐ 3. Document ID: US 6117669 A

L3: Entry 3 of 10

File: USPT

Sep 12, 2000

US-PAT-NO: 6117669

DOCUMENT-IDENTIFIER: US 6117669 A

\*\* See image for Certificate of Correction \*\*

TITLE: Biotin biosynthetic genes

DATE-ISSUED: September 12, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Furuichi; Yasuhiro	Kamakura			JP
Hoshino; Tatsuo	Kamakura			JP
Kimura; Hitoshi	Odawara			JP
Kiyasu; Tatsuya	Fujisawa			JP
Nagahashi; Yoshie	Fujisawa			JP

US-CL-CURRENT: 435/252.3; 435/320.1, 536/23.1

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC
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☐ 4. Document ID: US 6057136 A

L3: Entry 4 of 10

File: USPT

May 2, 2000

US-PAT-NO: 6057136

DOCUMENT-IDENTIFIER: US 6057136 A

TITLE: Biotin biosynthesis in Bacillus subtilis

DATE-ISSUED: May 2, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bower; Stanley Grant	Arlington	MA		
Perkins; John B.	Reading	MA		
Yocum; R. Rogers	Lexington	MA		
Pero; Janice G.	Lexington	MA		

US-CL-CURRENT: 435/119; 435/252.3, 435/252.31, 435/252.33, 435/325, 435/6, 536/23.2, 536/23.7, 536/24.1, 536/24.3

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KWIC
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☐ 5. Document ID: US 6020173 A

L3: Entry 5 of 10

File: USPT

Feb 1, 2000

US-PAT-NO: 6020173

DOCUMENT-IDENTIFIER: US 6020173 A

TITLE: Microorganism resistant to threonine analogue and production of biotin

DATE-ISSUED: February 1, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kanzaki; Naoyuki	Ibaraki			JP
Kawamoto; Tomohiro	Ikeda			JP
Matsui; Junji	Suita			JP
Nakahama; Kazuo	Nagaokakyo			JP
Ifuku; Ohji	Yokohama			JP

US-CL-CURRENT: 435/119; 435/118, 435/252.3, 435/252.33

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KWIC

☐ 6. Document ID: US 5919662 A

L3: Entry 6 of 10

File: USPT

Jul 6, 1999

US-PAT-NO: 5919662

DOCUMENT-IDENTIFIER: US 5919662 A

\*\* See image for Certificate of Correction \*\*

TITLE: Microorganism having low acetate forming capability, and process for production of useful substrate using same

DATE-ISSUED: July 6, 1999

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Haze; Shinichiro	Yokohama			JP
Ifuku; Ohji	Yokohama			JP
Kishimoto; Jiro	Yokohama			JP

US-CL-CURRENT: 435/69.1; 435/252.33, 435/71.2, 514/387

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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☐ 7. Document ID: US 5885792 A

L3: Entry 7 of 10

File: USPT

Mar 23, 1999

US-PAT-NO: 5885792

DOCUMENT-IDENTIFIER: US 5885792 A

\*\* See image for Certificate of Correction \*\*

TITLE: Biotin operon

DATE-ISSUED: March 23, 1999

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ifuku; Ohji	Yokohama			JP
Haze; Shinitiro	Yokohama			JP
Kishimoto; Jiro	Yokohama			JP
Nakahama; Kazuo	Nagaokakyo			JP

US-CL-CURRENT: 435/69.1; 435/252.33, 435/320.1, 536/23.1, 536/23.7

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KWC

☐ 8. Document ID: US 5693504 A

L3: Entry 8 of 10

File: USPT

Dec 2, 1997

US-PAT-NO: 5693504

DOCUMENT-IDENTIFIER: US 5693504 A

TITLE: Microorganism resistant to nicotinic acid analogue and production of biotin

DATE-ISSUED: December 2, 1997

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kanzaki; Naoyuki	Ibaraki			JP
Kimura; Hiroyuki	Sakai			JP
Matsui; Junji	Suita			JP
Nakahama; Kazuo	Nagaokakyo			JP
Ifuku; Ohji	Yokohama			JP

US-CL-CURRENT: 435/119; 435/252.3, 435/252.33, 435/325

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KWC

☐ 9. Document ID: US 5432067 A

L3: Entry 9 of 10

File: USPT

Jul 11, 1995

US-PAT-NO: 5432067

DOCUMENT-IDENTIFIER: US 5432067 A

TITLE: Process for production of biotin using bacteria belonging to the genus sphingomonas

DATE-ISSUED: July 11, 1995

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kumagai; Kazuo	Sanda			JP
Miki; Misao	Minoo			JP
Kawano; Emiko	Osaka			JP
Mitsuda; Satoshi	Takarazuka			JP

US-CL-CURRENT: 435/119; 435/170, 435/252.1, 435/822

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Drawn Desc	Image								

KMC

☐ 10. Document ID: US 5179011 A

L3: Entry 10 of 10

File: USPT

Jan 12, 1993

US-PAT-NO: 5179011

DOCUMENT-IDENTIFIER: US 5179011 A

TITLE: Process for producing biotin vitamers using novel microorganisms

DATE-ISSUED: January 12, 1993

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kishimoto; Jiro	Yokohama			JP
Haze; Shinichiro	Yokohama			JP
Ifuku; Ohji	Yokohama			JP

US-CL-CURRENT: 435/119; 435/252.33, 435/320.1

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Drawn Desc	Image								

KMC

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Terms	Documents
producing biotin.clm.	10

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L3: Entry 4 of 10

File: USPT

May 2, 2000

US-PAT-NO: 6057136

DOCUMENT-IDENTIFIER: US 6057136 A

TITLE: Biotin biosynthesis in Bacillus subtilis

DATE-ISSUED: May 2, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bower; Stanley Grant	Arlington	MA		
Perkins; John B.	Reading	MA		
Yocum; R. Rogers	Lexington	MA		
Pero; Janice G.	Lexington	MA		

US-CL-CURRENT: 435/119, 435/252.3, 435/252.31, 435/252.33, 435/325, 435/6, 536/23.2, 536/23.7, 536/24.1, 536/24.3

## CLAIMS:

What is claimed is:

1. A DNA molecule comprising a DNA sequence encoding a biotin biosynthetic enzyme of Bacillus subtilis; said DNA sequence not being in the milieu in which the wild-type of said sequence naturally occurs.
2. The DNA of claim 1, wherein said DNA comprises a gene selected from the group consisting of bioA, bioB, bioD, bioF, bioW, and bioI.
3. The DNA of claim 2 wherein said gene is bioA.
4. The DNA of claim 2 wherein said gene is bioB.
5. The DNA of claim 2 wherein said gene is the bioI gene.
6. The DNA of claim 1, wherein said DNA sequence is operably linked to a transcriptional promoter.
7. The DNA of claim 1, wherein said DNA sequence encodes at least two of said enzymes.
8. The DNA of claim 7, wherein a first one of said enzymes is encoded by a gene operably linked to a first transcriptional promoter, and a second one of said enzymes is encoded by a gene operably linked to a second transcriptional promoter.
9. The DNA of claim 1, wherein said DNA sequence is operably linked to one or more transcriptional promoters, at least one of said promoters being a constitutive promoter.
10. The DNA of claim 9, wherein said constitutive promoter is derived from the SP01 bacteriophage.

11. The DNA of claim 8 wherein

said first one of said genes is a gene selected from the group consisting of bioA, bioB, bioD, bioF, and bioW; and

said second gene is bioI.

12. The DNA of claim 11 wherein at least the following gene(s) is operably linked to said second promoter: said bioA gene, said bioB gene, or both said bioA and said bioB genes.

13. The DNA of claim 6 wherein said DNA sequence comprises bioA, bioB, bioD, bioF, bioW, and bioI.

14. A cell comprising the DNA of claim 1.

15. The cell of claim 14, wherein said DNA is amplified to multiple copies in said cell.

16. The cell of claim 14, wherein said DNA is stably integrated into the chromosome of said cell.

17. The cell of claim 16, wherein said DNA is amplified to multiple copies in said chromosome of said cell.

18. The cell of claim 16 wherein said DNA is integrated at the bio locus of said chromosome.

19. The cell of claim 17 wherein said DNA is present in multiple copies at more than one site in said chromosome.

20. The cell of claim 14, wherein said cell contains a mutation that confers resistance to azelaic acid.

21. The cell of claim 14, wherein said cell is mutated in birA.

22. The cell of claim 18 wherein said cell is Escherichia coli.

23. A method of producing biotin or a precursor thereof, said method comprising the steps of:

(a) providing the cell of claim 18;

(b) culturing said cell for a time and under conditions which allow synthesis of biotin or said precursor; and

(c) isolating said biotin or said precursor.

24. The method of claim 23, wherein said biotin or said precursor is secreted from said cell and isolated from the extracellular media of said cell.

25. The DNA of claim 8 wherein at least one of said promoters is a constitutive promoter.

26. The DNA of claim 25, wherein said constitutive promoter is derived from the SP01 bacteriophage.

27. A cell comprising the DNA of claim 8.

28. A cell comprising the DNA of claim 11.

29. The DNA of claim 1, wherein said DNA sequence comprises a regulatory site of a biotin operon, said regulatory site being selected from the group consisting of an operator, a promoter, a site of transcription termination, a site of mRNA processing, and a ribosome binding site.

30. Isolated DNA comprising *Bacillus subtilis* bioI or a gene involved in biotin synthesis that is specifically hybridizable to *Bacillus subtilis* bioI under the following conditions: hybridization in 5.times.SSC, 10-50% formamide, 1.times.Denhardt's solution, 100 ug/ml denatured salmon sperm DNA at 37.degree. C.-42.degree. C.

31. A cell comprising the DNA of claim 30.

## WEST Search History

DATE: Thursday, May 08, 2003

<u>Set Name</u> side by side	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u> result set
<i>DB=USPT,PGPB,JPAB,EPAB,DWPI; PLUR=YES; OP=ADJ</i>			
L3	producing biotin.clm.	10	L3
L2	Method for producing biotin	0	L2
<i>DB=USPT; PLUR=YES; OP=ADJ</i>			
L1	6436681	1	L1

END OF SEARCH HISTORY